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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KACKAR, RAM N	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/727,746	LIU, HENG	
	Examiner	Art Unit	
	Ram N. Kackar	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-17, 63-87, 89-103 and 131-132* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16,17,63-87,89-103,131 and 132* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/5/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 16-17 and 131-132 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Rocha-Alvarez et al (US Pub 20030005958).

Rocha-Alvarez et al disclose a plurality of small chambers connected to common gas supply and exhaust for increased throughput (Fig 4, Fig 5, Paragraph 26 and claim 11).

3. Claims 16-17 and 131-132 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Janakiraman et al (US 6843882).

Janakiraman et al disclose a plurality of small chambers for chemical vapor deposition (152A and 152B) connected to common gas supply (156) through flow controllers 232A and 232B and common exhaust 172 for increased throughput.

4. Claims 16-17 and 131-132 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tabata et al (US 2003/0133854).

Tabata et al disclose a plurality of small chambers for chemical vapor deposition (Fig 2 501, 502 and 503) connected to common gas supply through flow controllers 401-403 and 611-613 and common exhaust 71.

5. Claims 63-67, 71-75, 78-84, 87-93 and 96 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jurgensen et al (WO 02/18672).

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), induction (high frequency) heater outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite discharge ring (Col 1 lines 8-13). Sealing is by the diffusion ring (14). Jurgensen et al further disclose that the diffusion ring is made in the same way as support plate, tension plate, carrier plate and cover plate (para. 16) which are shown to be made of graphite with SiC coating.

6. Claims 63-67, 71-75, 78-84, 87-93 and 96 are rejected under 35 U.S.C. 102(e) as being anticipated by Jurgensen et al (US 20040003779).

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 23) to process a plurality of substrates sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), induction (high frequency) heater outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite coated with SiC discharge ring (Para8). Sealing is by the diffusion ring (14).

7. Claims 63-70, 72, 75-83 and 92-96 are rejected under 35 U.S.C. 102(b) as being anticipated by MacLeish (US 6113984)

MacLeish et al disclose a CVD coating device having a rotatable wafer carrier (Fig 14-116, Fig 1-48) sealed at a periphery to facilitate laminar flow (Abstract, Fig 14-130 and Col 14 lines 55-59), bottom of the chamber defined by the carrier (Fig 14-115, Fig 1-50), heater outside the chamber (Fig 2-44 and Fig 14-124) to heat the carrier, a shaft for rotating the wafer carrier (Fig 14-116, Fig 1-48) and a small distance from carrier to top (Fig 14-106, Fig 1-34a)

Regarding claim 95 MacLeish discloses purge of the area outside of reaction chamber 34a (Col 9 lines 53-60).

8. Claims 63-67, 71-75, 78-83, 92, 94 and 96-97 are rejected under 35 U.S.C. 102(e) as being anticipated by Park et al (US 20030005886).

Park et al disclose a MOCVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates to facilitate laminar flow (Fig 1), bottom of the

chamber defined by the carrier (Fig 1-3), radiant heater outside the chamber (70) to heat the carrier, gas inlet located centrally (31,41) and gas outlets above the carrier, a shaft for rotating the wafer carrier (41), a small distance from carrier to the cover (Fig 1).

9. Claims 63-67, 71-75, 78-83, 92-93 and 96-99 are rejected under 35 U.S.C. 102(b) as being anticipated by Shuji Nakamura (US 5334277).

Shuji Nakamura discloses a MOCVD coating device having a rotatable wafer carrier (Fig 7) to process substrates to facilitate laminar flow, bottom of the chamber defined by the carrier (Fig 7), induction heater outside the chamber (7) to heat the carrier, gas inlet located centrally (3) and gas outlets above the carrier, a shaft for rotating the wafer carrier, a small distance from carrier to the cover (Fig 1).

10. Claims 63, 97-99 and 102-103 are rejected under 35 U.S.C. 102(b) as being anticipated by Van de Walle et al (20020054745).

Van de Walle et al disclose an MOCVD coating device having a rotatable wafer carrier (Fig 17 and paragraph 49) to process substrates using alkyl gas like trimethylaluminum and ammonia (Paragraph 38 and 49) and teach that to prevent pre-reaction between alkyl gas and ammonia gases are introduced in the chamber separately- ammonia from inlet 1720 and alkyl gas from 1710 (Paragraph 49) to reduce requirement of carrier gas like Hydrogen.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirooka et al (US 4798166) in view of Maeda et al (US 5281295).

Hirooka et al disclose a plurality of small deposition chambers (Fig 1 A, B, C) connected to common gas supply (Fig 1 for example 101 and 102). Hirooka et al do not explicitly disclose flow controllers for each chamber.

Maeda et al disclose one common gas supply distributed to plurality of process stations through flow controllers (Abstract and Fig 1 20a-20e).

13. Claims 68-70 and 75-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624).

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates (*disclosed number is 5*) sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), heater outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite discharge ring (Col 1 lines 8-13).

Regarding the distance between the wafer carrier and top of the chamber, diameter of the gas inlet and speed of rotation of the carrier, these are result effective parameters and their optimization would be obvious for one of ordinary skill in the art at the time of invention.

14. Claims 85-86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Ikeda et al (JP 62211914).

Jurgensen et al disclose discharge ring for allowing gases to pass symmetrically over the substrate but do not disclose that the outlets through a hollow ring to collect for disposal.

Ikeda et al disclose a diffuser, which is a hollow ring with plurality of inlets and outlets (Fig 2 B and C).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to use a hollow ring to guide exhaust gases out of the chamber in order to have an orderly and laminar removal of exhaust gases.

15. Claims 97-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Van de Walle et al (20020054745).

Jurgensen et al do not disclose using alkyl and ammonia gas and do not teach the possibility of parasitic pre-reaction between the two.

Van de Walle et al disclose an MOCVD coating device having a rotatable wafer carrier (Fig 17 and paragraph 49) to process substrates using alkyl gas like trimethylaluminum and ammonia (Paragraph 38 and 49) and teach that to prevent pre-reaction between alkyl gas and

ammonia gases are introduced in the chamber separately- ammonia from inlet 1720 and alkyl gas from 1710 (Paragraph 49) to reduce requirement of carrier gas like Hydrogen.

Therefore keeping alkyl gas and ammonia separate until needed for deposition reaction would have been obvious for one of ordinary skill in the art at the time of invention.

16. Claims 97-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Van de Walle et al (20020054745) and further in view of Hirooka (US 4812331).

Jurgensen et al in view of Van de Walle et al disclose keeping alkyl gas and ammonia separate and disclose a structure for doing that but not as explicit as claimed.

Hirooka et al disclose a deposition system having multiple gas inlets separated from each other and concentric to each other (Fig 1) and disclose several ways of connecting gas supplies before entering the chamber (Fig 1) which includes pre-mixing as well as mixing only at the entrance of the chamber through concentric tubes (a, b, c).

Therefore connecting inlets separately as in Hirooka et al so as to prevent parasitic pre-reaction would be obvious to one of ordinary skill in the art at the time of invention.

Response to Arguments

Applicant's arguments filed 2/25/2008 have been fully considered but they are not persuasive.

Applicant argues that Rocha-Alvarez does not teach individually controlling amounts of components of the reaction gases provided to each of the chambers" and also does not disclose

the use of gas flow controllers suitable for doing so. Rather, according to Rocha-Alvarez the gas flow control apparatus 184 for one chamber is "responsive to flow measurement signal output 155 from the GFM 182.

In response it is noted that 155 represents a flow value in one line so as to enable the flow value in the other line to be related to it. However this is only an information and the other line could control the flow independent to it. This is merely an intended use.

Further if you have several chambers in a fab needing same gas it is common to have a same source branched to different chambers through flow control devices.

Compare it with water supply in homes in a community coming from same source through individual flow meters and exiting to common sewage. How inventive could that be ?

Applicant argues that Jurgenson does not disclose that the ring diffuser is comprised of at least one of SiC coated graphite. Rather, Jurgenson states that the gas discharge ring 5 "is formed of solid graphite" (column 3, fines 2-4).

In response it is noted that the gas discharge ring 5 formed of graphite could be coated with SiC (See for example US 20040003779 para. 8).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Ram N Kackar/
Primary Examiner, Art Unit 1792